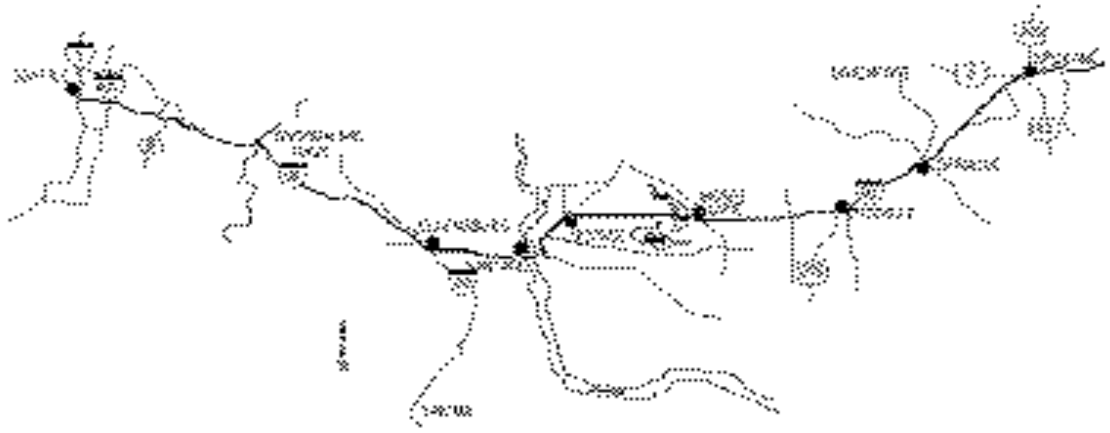
Executive Summary

This executive summary presents the final recommendations and a brief description of the Interstate 90 (I-90) Seattle to Spokane Intelligent Transportation system (ITS) Early Deployment Program. The study was performed by Parsons Brinckerhoff, PB Farradyne Inc., and their subconsultants.

Project Description

The I-90 Seattle to Spokane study is intended to provide the Washington State Department of Transportation (WSDOT) with an implementation plan for the deployment of ITS technologies along I-90 from Seattle to Spokane. The study follows the guidance set forth by the WSDOT "Venture" program in providing a fully integrated state-wide transportation system on the roadways within WSDOT's jurisdiction. The study focused on specific applications in the areas of traffic management, traveler information, emergency management, and commercial vehicle operations (CVO) with the emphasis on providing specific projects to be deployed throughout the corridor. As a result of this study, fourteen project prospectuses that address the corridor transportation needs have been prepared. Each prospectus includes a project description, cost estimate, and an implementation schedule

The corridor study included the seven project tasks summarized below.



Corridor Limits: Issaquah (MP 18) to Washington/Idaho Border (MP 299)

Work Element 1 - Assess Transportation Needs
Work element 1 consisted of corridor tours and interviews with key stakeholders and officials from the WSDOT (northwest, northeast, southwest and eastern regions), Washington State Patrol (WSP), cities, counties, and others. Data was gathered relating to the transportation needs along the I-90 corridor with emphasis given to safety, congestion management, and commercial vehicle operations.

Work Element 2 - Identify Corridor ITS Opportunities
Based on the findings of the needs assessment, work element 2 identified specific ITS applications to address the corridor needs.

Work Element 3 - Recommend Corridor Strategies
Based on an assessment of appropriate ITS applications and project steering committee input, work element 3 finalized and prioritized the specific ITS applications considered for implementation.

Work Element 4 - Develop Corridor Plan
Work element 4 consisted of the preparation of specific project prospectuses recommended for the corridor by the steering committee. Both cost estimates and benefit and cost analyses were conducted for each of the proposed projects.

Work Element 5 - Develop Corridor Communication Plan
Work element 5 identified the existing communication infrastructure along the corridor. Specific recommendations on the communication infrastructure to be utilized for the ITS elements along the corridor was included as part of the corridor plan developed in work element 4.

Work Element 6 - ITS Coordination and Outreach Effort
Work element 6 established the project steering committee which provided input, direction, and participative decision-making for the project. The steering committee included members from WSDOT, WSP, Federal Highway Administration, cities, counties and metropolitan planning organizations (MPO). In addition, the coordination and outreach efforts for the project were initiated during this work element. This effort was intended to stimulate interest and deepen the understanding of the ITS efforts for the corridor through a variety of media.

Work Element 7 - Final Report
Work element 7 consolidated the results of the previous work elements and developed the executive summary.

Corridor Synopsis

I-90 is an east-west interstate highway that stretches across Washington, connecting the cites of Seattle, Bellevue, Issaquah, North Bend, Cle Elum, Ellensburg, Moses Lake, Ritzville, and Spokane. I-90 passes through the Cascade Mountains via Snoqualmie Pass, and is a vital economic link between eastern and western Washington. This route is primarily a four-lane corridor, with the exception of urbanized areas, and serves regional and national transport, tourism and commuters. The focus of this study is on the portion of I-90 east of Issaquah (MP 18) to the Washington/Idaho border (MP 299), a total length of 281 miles or 452 kilometers. This section of corridor passes through King, Kittitas, Grant, Adams, Linclon and Spokane Counties.

The WSDOT operates a surveillance, control, and driver information (SC&DI)

system along the corridor from MP 0 to MP 25 as part of the Northwest Region's Transportation Systems Management Center (TSMC). The SC&DI infrastructure includes ITS field devices such as ramp meters, closed circuit television (CCTV) cameras, data stations, variable message signs (VMS), and highway advisory radio (HAR). The system utilizes a fiber optic cable infrastructure for the transmission of analog video, while Synchronous Optical Network (SONET) technology is utilized for the transmission of data. This infrastructure provides tremendous benefits for the WSDOT, including improved freeway efficiency through maintaining freeway capacity, reduction in merging and congestion related incidents, reduction in time needed to clear incidents, and improved traffic information available to motorists.

The SC&DI infrastructure along the I-90 corridor also includes the TravelAid project currently extending from MP 33 to MP 73. This system involves the use of variable speed limit and message signs and in-vehicle display units that provide mountain pass closure status information as well as road, weather, and traffic conditions. Work is also underway in the eastern region to develop a traffic management system including CCTV, vehicle detector stations, and HAR as part of a cooperative effort between the Spokane Regional Transportation Council, City of Spokane, Spokane County, WSDOT and Spokane Transit.

System Architecture

The northwest region of WSDOT has an extensive regional architecture currently in place along the I-90 corridor in accordance with the tenets of the ITS national architecture. The SC&DI program has developed installation, operations, and maintenance standards for this ITS infrastructure. This study recommends the expansion of SC&DI field devices and the communications infrastructure east of the greater central Puget Sound region, in the Spokane urban area, and in other strategic locations along the corridor.

The recommended expansion is highlighted by two specific projects recommended as part of this study. The northwest region TSMC Expansion project would extend the SC&DI infrastructure east to the Edgewick Road interchange (MP 34). The eastern region traffic management system would further this SC&DI infrastructure in the Spokane Area. The initial phases of these two projects would focus on the installation of the communications infrastructure and field devices at priority corridor locations, followed by the final build-out of the ITS field devices and communication infrastructure in future phases. Other recommended projects would be deployed throughout the corridor utilizing the ITS field devices when applicable and introducing new technologies to address the identified corridor needs such as rest area security, weather related warning systems, and traveler information. Certain project elements would utilize leased communication lines for both field device and control center communications in the short-term followed by the possible long-term integration with the WSDOT-owned fiber optic communication links as this infrastructure expands throughout the corridor.

It is important that each of the recommended projects allow for the exchange of data with the WSDOT Smart Trek ITS backbone currently being developed under the U.S. DOT Model Deployment Initiative (MDI) Program. Each effort must emphasize the utilization of consistent communication protocols and data exchange schemes. The data exchange would benefit the individual projects along the corridor by providing access to corresponding

traffic information. It would also benefit the ITS backbone system itself by adding valuable data to this integrated traveler information network.

Project Summaries

The corridor study resulted in fourteen specific project recommendations. The following is a summary of the recommended deployment for the corridor.

Broadcast Radio Dissemination System
Develop a system that allows route, weather, and traffic condition information to be sent to local broadcast radio stations. Each station would then have the capability to broadcast this information to its listeners.

Ice Detection Weather Warning System
Develop an ice detection and warning system at selected locations. Sensors will detect when bridge and road conditions become icy and a warning system will disseminate real-time, site-specific information to travelers, WSDOT maintenance personnel, and the WSP.

Internet Pre-Trip Traveler Information
Expand WSDOT's existing capabilities to provide weather, travel, and traffic information on the World Wide Web (WWW).

Rest Area Information Kiosks
Install traveler information kiosks at rest stops along the corridor. Traveler information will include both static and real-time data applicable for the corridor.

TravelAid Advance Information System
Provide pre-trip and en-route information regarding pass closure status and road, weather, and traffic conditions to travelers. Information will be disseminated via roadside VMS and communication beacons to participating drivers equipped with in-vehicle devices.

Columbia River Bridge Information System
Plan, develop, and implement a system that detects road, weather, and traffic conditions on and near the Columbia River bridges to provide advanced warning of hazardous conditions to motorists. These conditions would include high wind, low visibility, ice, congestion, and overspeed vehicles.

Chain-up Area Parking Management System
Develop a traffic management system to provide travelers with information on chain-up area parking space availability. This would maximize the utilization of existing roadside facilities and enhance safety.

Speed Detection/Warning System
Install a speed detection/warning system at steep upgrade and downgrade locations as well as areas of known recurrent speeding. The warning system would be activated upon sensing a potentially hazardous condition.

Variable Speed Limit Signing and Weather Warning System
Implement a variable speed limit signing and weather warning system near Easton Hill between MP 72.5 and 74.5 and expand coverage of the existing TravelAid variable speed limit signing and weather warning system through in-fill of devices between MP 33 and MP 72.5. The system would be integrated with the existing TravelAid system and would detect changing weather conditions and provide motorists with information, weather-related warnings, and variable speed limits.

Northwest Region TSMC Geographic Expansion

Expand the WSDOT SC&DI network along I-90 from Issaquah (MP 18) to Edgewick Road interchange (MP 34). This would expand the geographic coverage of the northwest region's Transportation Systems Management System (TSMC) eastward and would provide additional traffic field devices along this heavily traveled corridor. The expanded coverage along this stretch of roadway would provide better traffic management capabilities and increased motorist safety.

Eastern Region Traffic Management System
Develop a Traffic Management System (TMS) in the Spokane Area (I-90 MP 276 to MP 292) consisting of traffic field devices connected through communications infrastructure to a local Traffic Operations Center (TOC). WSDOT and WSP personnel at the TOC would be able to monitor and control the TMS field devices and thus effectively manage traffic operations and incidents along this corridor.

Traffic Data Management System
Develop a corridor-wide traffic data management system that would utilize the existing permanent data station program currently located along the I-90 corridor. This data would be readily available to local cities, counties, and planning agencies in the region for their use.

Rest Area Security System
Enhance public security at rest areas along the corridor through the establishment of safe areas with enhanced lighting and improved surveillance and communication to emergency services.

Portable License Plate Optical Reader
Deploy portable license optical reader technologies to assist the WSP in streamlining inspection efforts at weigh stations, assist in enforcement, and provide WSDOT personnel with the means to conduct origin and destination studies.

Deployment Costs

The following is a budgetary estimate for the fourteen projects recommended for the corridor. These costs reflect initial project developments and deployment. In many cases, the detailed prospectus recommends limited application such as prototype and spot deployments during phase one, followed by expanded application during subsequent phases. It is widely recognized that the costs of implementation beyond phase one will be significantly affected by the availability of rapidly developing technology and thus are not included in these estimates.

ITS Project	Estimated Capital Cost
Broadcast Radio Dissemination System	$182,000
Ice Detection Weather Warning System	$768,000
Internet Pre-Trip Traveler Information	$204,000
Rest Area Information Kiosks	$310,000
TravelAid Advance Information System	$948,000
Columbia River Bridge Information System	$828,000
Chain-Up Area Parking Management System	$413,000
Speed Detection/Warning System	$1,005,000
Variable Speed Limit Signing and Weather Warning System	$935,000
Northwest Region TSMC Geographic Expansion	$2,860,000
Eastern Region Traffic Management System	$4,710,000
Traffic Data Management System	$325,000
Rest Area Security System	$228,000
Portable License Plate Optical Reader	$22,000
Total Deployment Costs	**$13,738,000**